Introduction to Target Industry Analysis

A target industry analysis is an integral component of a successful economic development program. Recruiting new firms into an area as well as helping to grow entrepreneurial firms from within are competitive and challenging tasks. However, for every firm looking to relocate or find a new facility site, there are dozens or even hundreds of communities pursuing that prospect.

An effective economic development marketing program places the name of the region or community in front of key decision makers at expanding firms and their location consultants. The first objective is to secure placement of the community on the initial list of possible locations for a new corporate facility. Next, the community has to survive a series of short-list cuts and finally prevail over all other competitors.

Communities develop marketing programs that may include direct mail, advertising, trade shows, company visits, or other elements to achieve that first critical step of getting on initial lists of location possibilities. Marketing programs are expensive, and most communities with successful economic development programs conduct up-front research to identify where their marketing efforts should be directed. A "shotgun" approach of mailing generic brochures to a random list of companies "up North" or elsewhere is not a cost-effective way of conducting economic development marketing. Many of the firms receiving the mailings may

not be in the growth mode, or even if they are, the particular community may not be a desirable location for many of the firms.

Instead of the shotgun approach, most successful economic development programs employ the "rifle" approach of identifying industries and companies that are in the growth mode and are most likely to find the particular community a suitable location for its new operations. After completing this analysis, mailings and/or advertising can be directed at those firms most likely to make good prospects. In other words, a targeted marketing program generates the most "bang for the buck" for a region or community.

Classifying Industries

In the United States, the most commonly used industrial classification has been the Standard Industrial Classification Code (SIC) developed by the U.S. Office of Management and Budget. The 1987 edition of the Standard Industrial Classification Manual covers the entire field of economic activities: agriculture, forestry, fishing, hunting and trapping; mining and construction; manufacturing; transportation; communications; electric, gas and sanitary services; wholesale trade; retail trade; finance, insurance and real estate; services; and public administration.

The broadest industry definition is the 2-digit SIC code level, which ranges from Industry Group 01, Agricultural Products - Crops, to Industry Group 97, Public Administration - National Security and Affairs. Manufacturing firms are classified into 20 industry areas from Industry Group 20, Food and Kindred Products, to Industry Group 39, Miscellaneous Manufacturing Industries.

The 2-digit SIC code level is very broad. More narrow industry definitions are possible by using 3- and 4-digit levels of classification. The most frequently used code level is the 4-digit SIC level of classification. To illustrate, a manufacturing firm that produces air conditioning units would be classified in Major Group 35 (Industrial and Commercial Equipment and Computer Equipment), Industry Group 358 (Refrigeration and Service Industry Machinery), and Industry Number 3585 (Air Conditioning and Warm Air Heating Equipment and Commercial Industrial Refrigeration Equipment).

The SIC coding system is widely used for many purposes, both for the majority of public sector data as well as for most privately generated data. Numerous target industry studies utilize the SIC codes. However, the system has some shortcomings. For example, the SIC code system describes in minute detail certain traditional manufacturing activities, some of which have declined in economic importance, while newer emerging activities may not be as well classified.

Another shortcoming is that within a 4-digit SIC code, firms can vary widely in their characteristics, particularly within the miscellaneous and "not elsewhere classified" (NEC) categories. If firms within a 4-digit SIC code vary widely in their locational needs, then some of the firms targeted in the grouping may not be feasible prospects.

Regardless of the shortcomings of the SIC coding system, it is still most practical to identify target industries using the 4-digit SIC code industry definitions because most industry information and intelligence (e.g., growth rates) are based on the this classification. In addition, specific target companies within each industry are usually identified in databases by 4-digit SIC code. When using these databases to select high-growth target companies for the marketing campaign, SIC codes must be specified.

Despite the general reliance on the SIC classification system in target industry studies, there are certain economic activities that are often good targets and that clearly do not fit into the SIC system. A good example is call centers or office-related activities such as customer service or technical support for manufacturing or service companies. Employment in these activities is included in the industrial classification of the company.

The SIC system is being replaced by a newer system, the North American Industrial Classification System (NAICS). NAICS has been recently

established between the United States, Canada, and Mexico as an update to the Standard Industrial Classification system. The NAICS includes 20 sectors and is far more comprehensive than the 1987 SIC system. It better represents our current economy and its diverse sectors. The NAICS gives special attention to developing production-oriented classifications such as new and emerging industries, service industries, and industries engaged in the production of advanced technologies. The NAICS uses a six digit coding system to identify particular industries and their placement in this hierarchical structure of the classification system. The NAICS will be implemented by Federal statistical agencies over a period of several years. The federal government also plans to provide detailed information as to how to link data from a SIC basis to the NAICS basis to facilitate use of the new system.

Target Industry Criteria

There are various criteria that can be used in selecting industries to be included in a targeted marketing program, depending on the goals and objectives of the region or community. Some communities choose to target certain sectors because they are consistent with overall strategic goals. The City of Asheville held a leadership workshop in which stakeholders and leaders from the area voted on the top economic development priorities as well as their preference for target industries for the City of Asheville. As a

result of the industries selected at the leadership workshop and further Lockwood Greene analysis, six knowledge-based industries were selected as top priorities for the City of Asheville. The following report contains profiles on each industry. The profiles define the industries and their subsectors, and include information about overall trends in the industry, projected growth, and employment statistics. LGC examined our database derived from County Business Patterns data (U.S. Department of the Census) to determine employment growth between 1993 and 1996 in these industries at the national level (which was using the latest federal data available). We calculated the percent change in national total employment to measure "employment growth" in each sector. Furthermore, LGC gathered data from the Department of Commerce, trade journals and trade associations, the Internet, industry institutes and private companies to examine trends in the industry.

As a result of LGC analysis and the leadership workshop results, the following six industries have been selected as top priorities for the City of Asheville:

Knowledge-based High Tech Target Industries for the City of Asheville:

Medical Care (including wellness and alternative medicine)
Corporate Back Offices/Call Centers
Film Making
Internet Related Activity
Environmental Technology
Software Development

Although these target industries present opportunities for the City of Asheville, there are some constraints in the areas of software development and environmental technology due to the lack of a significant research university in the Asheville area. This will be further discussed in each individual profile when it is applicable.

Professional services is also a target for the City of Asheville. However, professional services such as law and engineering are particularly driven by the local market; therefore, as long as the economy in Asheville continues to grow, these industries are likely to grow as well.

Other industries such as tourism and arts and crafts were also identified at the leadership workshop as priorities. LGC fully supports the continued development of these industries. Due to the nature of these industries and the fact that other organizations are thoroughly involved in their marketing

and development, we will not provide profiles on these industries. However, LGC recommends that tourism and arts/crafts should continue to be pursued by the City. Each industry has an important economic impact on the area.

Manufacturing industries were also selected as priorities at the leadership workshop. LGC agrees that certain manufacturing targets are appropriate for the City of Asheville; however, the City and Buncombe County both need to expand their inventory of sites before recruiting large manufacturing operations. Some of the sites available may be adequate for small-scale operations, but overall, the site inventory is almost non-existent. Once this situation is improved, industries such as electronic equipment, industrial machinery and equipment, fabricated metal, and printing and publishing should be pursued.

The Impact of High-Tech Development in the U.S. and the National Trends Toward Knowledge-Based Industries

In order to understand the importance of knowledge-based, high tech industries to the City of Asheville, it is important to understand the overarching principles effecting our economy at large and the trends projected to continue into the next millennium. The following pages will describe and define the "the high-tech revolution" and how it is impacting our economy, our industries, and ultimately, how it will effect local economic development efforts.

The United States is currently undergoing one of the most significant transformations of its economy in all of its history. The high-tech revolution can be compared to other defining eras in U.S. history such as the industrial revolution. Forecasters have underestimated the growing importance of high-tech development on our economy and each year figures continue to exceed expectations. The high-tech revolution encompasses a variety of trends simultaneously occurring, which together have produced one of the most dramatic technology driven periods of development.

The Milken Report titled, "*American's High-Tech Economy… Growth, Development, and Risks for Metropolitan Areas*" produced in July of 1999, explains that many terms are used to describe the impact of high technology

on the nation's economy. Some refer to this change in the economy as the "new economy"; to others it is "the digital economy"; and yet to others it is "the information age". Likewise, similar to the variety of names employed to describe this new trend, a variety of industries have been effected and forever changed due to new technologies and the growth of knowledge-based industries.

The new economy is described as one greatly dependent on information technology. According to John Viulamis in his book, The World of Information Technology, information technology "encompasses all the technologies used for creating, abstracting, visualizing, presenting, collaborating, communicating and otherwise "managing" the flow of information." Information is the commodity, and high-tech developments such as telecommunications and computerization have enabled the advanced exchange of that information. Industries specifically involved in facilitating the information exchange include but are not limited to data processing, distribution tracking centers, dispatch centers, internet providers, electronic commerce providers, web site developers, shared services/back office, software and systems development, cable and telecom, and the like – the list is endless.

Many economists now believe that the "high tech sector is boosting the long term potential growth path of the U.S. economy"[1] (Milken Report). The U.S. Department of Commerce 1999 Report entitled *"The Emerging*

Digital Economy II" reports that information technology industries (such as producers of computer and communications hardware, software, and services) contributed on average to 35 percent of the nation's real economic growth between 1995 and 1998[2]. Core information technology companies such as electronic components and accessories, computer and office equipment, and computer and data processing services are among the fastest growing in the U.S. economy.

High tech developments have also affected industries such as medical services and motion picture production, two of the target industries for the City of Asheville. Both industries have grown and developed due to new technological innovations that effect how medicine is practiced and how movies are made. The Milken Report lists electronic components and accessories, computer and office equipment, computer and data processing services (which includes software, data management consulting, programming consulting, computer integrated systems design, and internet related activity), medical equipment, instruments and supplies; communications equipment, drugs, and motion pictures among the top twenty fastest growing high-tech industries in the U.S[3]. Since technological advancements are so pervasive, effecting almost all industries and dramatically effecting the everyday lives of Americans, communities must understand these trends in order to create the necessary business environment to nurture technological growth or recruit technological growing industries.

As technology accounts for an increasing proportion of national output, metropolitan areas that have demonstrated the ability to foster a nurturing environment for high tech start ups, that share a high percentage of IT workers, and that already possess a disproportionate amount of firms deploying information technology, are experiencing superior economic performance, according to the Milken Report's section on Technology and Metropolitan Economic Performance[4]. However, the Milken Report also points out that information technology is "allowing some metropolitan areas to exploit key locational advantages, such as lower business costs or some quality of life attribute, by permitting some forms of economic activity to be performed from more remote locations"[5]. It is in this last point that Asheville has its greatest advantage. Some high-tech firms will consider Asheville as a business location because of its exceptional quality of life, even though the area is "more remote."

The City of Asheville recognizes that in order to achieve the greatest degree of economic growth, it too must take part in the emerging economy and embrace the information age by fostering an environment conducive to technological innovation and by attracting firms that utilize and employ high technology. LGC does not want to give the impression that high tech firms are the only firms worth pursuing or the only development strategy worth employing. We are of the opinion, however, that high-tech industries have the greatest growth potential, and therefore, may likely have the greatest impact on the local economy if nurtured or recruited to the area.

Communities with a high percentage of college degreed persons and those specifically schooled in IT or related disciplines, combined with the presence of a reputable research institute/university, are widely discussed as the most important factors in determining a high technology presence/cluster. However, the Milken Report reveals that a successful high tech economy must be multi-dimensional and that different strategies should be employed at different stages of the business cycle. The Milken Report reveals that factors such as tax incentives, cost considerations, and research institutions are most important at the inception stage. Then, as the high-tech company moves into the growth stage, factors such as a skilled and educated labor force, re-education and training facilities, and the establishment of trade groups and affiliations become more important. During fortification, public investment, commercialization of ideas, housing/quality of life, and attention to changing needs become more important. All of these dimensions must work together to achieve a successful environment for high-tech industry.

Specific strategies to foster a nurturing business environment, as well as the natural limitations that exist for the City of Asheville with regard to each high tech target industry, will be discussed in the target industry profiles that follow.

Knowledge-based High Tech Industry Profiles

Health Services Industry
SIC Major Group 80

The health services industry (SIC major group 80) is composed of businesses primarily involved in providing medical, surgical, or other health services to persons. This industry is divided into 20 four digit SIC groups, which include the offices and clinics of doctors of medicine (SIC 8011), dentists (SIC 8021), doctors of osteopathy (SIC 8031), chiropractors (8041), optometrists (8042), podiatrists (8043), and health practitioners, not elsewhere classified (8049). Also included are skilled nursing care facilities (SIC 8051), intermediate care facilities (SIC 8052), nursing and personal care facilities not elsewhere classified (SIC 8059), general medical and surgical hospitals (SIC 8062), psychiatric hospitals (SIC 8063), specialty, hospitals, except psychiatric (SIC 8069), medical laboratories (SIC 8071), dental laboratories (SIC 8073), home health care services (SIC 8082), kidney dialysis centers (SIC 8092), specialty outpatient facilities not elsewhere classified (SIC 8093), and health and allied services not elsewhere classified (SIC 8099).[6]

Currently, one of the biggest issues facing the health services industry is the need to control health care costs. In an attempt to control costs, healthcare providers are now offering more economical, cost-conscious managed-care plans instead of the traditional “fee-for service indemnity plans” that have

been so popular in the past. Managed-care plans reduce medical costs because under these plans, a patient's medical procedures and visits to specialists are closely monitored. As a result of stabilizing health care costs, consumers are becoming more selective in choosing services and are demanding better quality for their medical dollar.[7]

Another prevalent trend in the health services industry is the increasing popularity of alternative medicine. Nontraditional medicine, otherwise known as "alternative medicine," is difficult to define because it encompasses such a wide range of practices and treatments. Moreover, some of these practices do not conform to standards of the medical community, so they are not typically taught in medical schools. However, many forms of alternative medicine, such as acupuncture and chiropractic services, are finally gaining acceptance in the medical community. As a result, more and more hospitals and insurance companies have begun to accept certain nontraditional services as valid forms of treatment. According to the National Institute of Health, alternative medical practices include: diet, nutrition, and lifestyle changes; mind/body control; pharmacological and biological treatments; bioelectromagnetic applications; and herbal medicine. According to *U.S. Industry and Trade Outlook, '98*, nontraditional medicine has begun to consume a significant portion of health care expenditures in the U.S. It is interesting to note that most patients of nontraditional medicine tend to be well educated and relatively affluent.[8]

Employment in the health services industry continues to grow. According to the U.S. Department of Labor, nearly one out of every nine new jobs created by the economy between 1986 and 1996 was in the health care field. The U.S. Department of Labor expects this trend to continue between 1996 and 2006. Employment in health service jobs increased by 40% between 1986 and 1996. The U.S. Department of Labor predicts that between 1996 and 2006, employment in health service jobs will increase faster than the average rate of increase for all occupations.[9]

Employment Growth in the U.S. Health Services Industry, 1993 to 1996

SIC	DESCRIPTION	1993 EMP.	1996 EMP.	EMP. GROWTH*
8080	Home Healthcare Services	594,183	779,365	31.17%
8049	Offices of Health Practitioners, NEC	123,851	151,933	22.67%
8090	Health and Allied Services, NEC	317,061	387,020	22.06%
8040	Offices of Other Health Practitioners	312,046	353,204	13.19%
8043	Offices and Clinics of Podiatrists	27,044	30,215	11.73%
8030	Offices of Osteopathic Physicians	48,861	53,700	9.90%
8020	Offices and Clinics of Dentists	581,378	634,709	9.17%
8042	Offices and Clinics of Optometrists	71,672	76,810	7.17%
8010	Offices and Clinics of Medical Doctors	1,577,082	1,688,823	7.09%
8050	Nursing and Personal Care facilities	1,689,277	1,806,086	6.91%
8072	Dental Laboratories	39,742	42,038	5.78%
8000	Health Services	10,403,118	10,990,227	5.64%
8070	Medical and Dental Laboratories	187,027	190,629	1.93%
8041	Offices and Clinics of Chiropractors	89,177	90,609	1.61%

8071	Medical Laboratories	147,240	148,231	0.67%
8060	Hospitals	5,092,716	5,067,349	-0.50%

Source: U.S. Bureau of the Census County Business Patterns

*Employment growth is measured by the percent change in total employment at the national level from 1993 to 1996.

As indicated in the above table, the fastest growing sector of the health services industry is home health care (SIC 8080). The home health care industry increased in employment by 31.17% between 1993 and 1996. Home healthcare includes home health agencies, home care aide organizations, and hospices. According to *U.S. Industry and Trade Outlook '99*, the drive behind home health care's increasing popularity is its cost effectiveness. For many elderly, sick, or disabled persons who simply cannot afford the high cost of hospital or nursing home care, home health care is a less expensive alternative.[10]

Offices of other health practitioners (SIC 8040) is another one of the fastest growing sectors of the health care services industry. This group includes offices and clinics of chiropractors (SIC 8041), optometrists (SIC 8042), podiatrists (SIC 8043), and health practitioners not otherwise classified (SIC 8049). As a whole, this sector grew in employment by 13.9% between 1993 and 1996. It is significant to note that two of the subsections of this group (offices of other health practitioners not otherwise classified and offices and clinics of podiatrists) had two of the highest growth rates in the health

services industry. Offices and clinics of health practitioners not otherwise classified had the second highest growth rate (22.67%) in the health services industry. This group includes offices of audiologists, acupuncturists (except M.D.), hypnotists, dieticians, nutritionists, naturopaths, clinical psychologists, psychiatric social workers, dental hygienists, speech pathologists, paramedics, physicians' assistance, and midwives. Offices and clinics of podiatrists grew in employment by 11.73%, which was the fifth highest growth rate in the health services industry. The 1987 Standard Industrial Classification Manual defines this subsection as "establishments of licensed practitioners having the degree of D.P. and engaged in the practice of podiatry."[11]

Health and allied services not elsewhere classified (SIC 8090) was the third fastest growing sector of the health services industry between 1993 to 1996, expanding in employment at a rate of 22.06%. Health and allied services not elsewhere classified include establishments such as kidney dialysis centers, alcohol treatment out patient clinics, drug treatment outpatient clinics, family planning clinics, blood banks, and sperm banks.[12]

The sixth highest growing subsection of the health services industry between 1993 and 1996 was offices and clinics of osteopathic physicians (SIC 8030), which grew in employment by 9.90%. This group consists of offices or clinics of licensed practitioners who have D.O. degrees and practice general or specialized osteopathic medicine and surgery.[13]

Offices and Clinics of Dentists (SIC 8020) also had a high employment growth rate between 1993 and 1996. This group's employment increased by 9.17%, which was comparable to the growth rate of offices and clinics of osteopathic physicians during the same period. Offices and clinics of dentists consists of "establishments of licensed practitioners having the degree of D.M.D. or D.D.S. (or D.D.Sc.) and engaged in the practice of general or specialized dentistry, including dental surgery." [14]

The chart on the following page depicts the average annual salaries for healthcare workers as well as the percent change in salary between 1993 and 1996 by SIC Code. It is interesting to note that the highest average pay increase between 1993 and 1996 (15.8%) occurred in SIC 8050, nursing and personal care facilities. The second highest pay increase occurred in SIC 8049 (offices of healthcare practitioners, NEC), and the third highest in SIC 8020 (offices and clinics of dentists). The highest wages in the healthcare field occur within firms in SIC 8010, offices and clinics of medical doctors ($52,887). The second highest wages occur within SIC 8030, offices of osteopathic physicians. Other higher wage SIC codes include medical laboratories (SIC 8071), medical and dental laboratories (SIC 8070), and hospitals (SIC 8060).

Average Increase in Salary for U.S. Healthcare Workers from 1993 to 1996, Sorted by Salary Increase

SIC	Description	1993 Avg. Salary*	1996 Avg. Salary*	Increase in Avg. Salary**
8050	Nursing and Personal Care Facilities	$14,625	$16,831	15.08%
8049	Offices of Health Practitioners, NEC	$24,921	$28,032	12.49%
8020	Offices and Clinics of Dentists	$24,376	$27,355	12.22%
8042	Offices and Clinics of Optometrists	$19,295	$21,565	11.76%
8072	Dental Laboratories	$21,391	$23,869	11.58%
8030	Offices of Osteopathic Physicians	$35,103	$38,973	11.02%
8040	Offices of other Health Practitioners	$22,025	$24,396	10.76%
8060	Hospitals	$26,849	$29,627	10.35%
8000	Health Services	$27,204	$29,897	9.90%
8080	Home Health Care Services	$16,204	$17,771	9.67%
8090	Health and Allied Services, NEC	$24,183	$26,470	9.46%
8010	Offices and Clinics of Medical Doctors	$48,375	$52,887	9.33%
8043	Offices of Clinics of Podiatrists	$23,797	$25,714	8.06%
8070	Medical and Dental Laboratories	$27,122	$29,080	7.22%
8071	Medical Laboratories	$28,664	$30,581	6.69%
8041	Office and Clinics of Chiropractors	$19,552	$20,063	2.61%

Source: U.S. Bureau of the Census County Business Patterns

*The average salary is calculated by dividing the annual payroll by the total number of employees.
**Increase in average salary is measured by the percent change in average salary at the national level from 1993 to 1996.

The healthcare industry has a strong presence in the City of Asheville. For example, as indicated in the chart on the next page, Asheville's healthcare industry employs a total of 12,027 people. Moreover, the chart also shows that 516 of the City's businesses fall into the healthcare category. The healthcare sectors currently employing the most people in Asheville are SIC 8062 (general medical and surgical hospitals), which employ a total of 4,952;

SIC 8011 (offices and clinics of medical doctors), which employ a total of 1,912; and SIC 8051 (skilled nursing care facilities), which employ a total of 1,151 workers.

Total Employment in the Health Sector in Buncombe County, Sorted by Total Employment

SIC	Description	Total Emps.	No. Businesses
8062	General medical and surgical hospitals	4,952	3
8011	Offices and clinics of medical doctors	1,912	176
8051	Skilled nursing care facilities	1,151	13
8059	Nursing and personal care, nec	836	34
8082	Home health care services	743	13
8021	Offices and clinics of dentists	437	75
8069	Specialty hospitals, except psychiatric	402	6
8071	Medical laboratories	380	8
8093	Specialty outpatient clinics, nec	300	26
8049	Offices of health practitioner	275	83
8099	Health and allied services, nec	192	10
8063	Psychiatric hospitals	100	1
8041	Offices and clinics of chiropractors	83	28
8042	Offices and clinics of optometrists	71	18
8072	Dental laboratories	64	12
8092	Kidney dialysis centers	57	1
8052	Intermediate care facilities	51	2
8043	Offices and clinics of podiatrists	20	6
8031	Offices and clinics of osteopathic physicians	1	1
	Total/Avg	12,027	516

Source: Dun and Bradstreet MarketPlace Data, Oct.-Dec. 1999

Locational Considerations

Although the need for medical service will never disappear, the rate of growth of various medical sectors is often dependent on the availability and nature of government funding in the health industry. Generally, this industry is also very market driven. It grows and expands in those communities and regions that are experiencing population and income growth.

The technology component of the medical industry is tied closely to the presence of medical schools, federal research labs, and other research institutions. It is unlikely that R&D operations in the medical industry would be attracted to a community that did not have these in place.

Wellness programs and alternative medicine are less tied to traditional markets and tend to be drawn to regions with a high quality of life and a culture supporting new approaches to health care. Although the practice of alternative medicine is fairly widespread throughout the United States, there appear to be communities in which it is concentrated. These concentrations tend to be where respected institutional foundations are present, such as the Program in Integrative Medicine at the University of Arizona College of Medicine in Tucson, the Southwest College of Naturopathic Medicine in Scottsdale AZ, the Arizona Osteopathic College of Medicine in Glendale AZ, the National College of Naturopathic Medicine in Portland OR, the Center for Complementary / Alternative Medicine at the State University of New

York at Stony Brook, the Minneapolis Medical Research Foundation, the University of Michigan in Ann Arbor.

Additionally, the practice of alternative medicine has come to be associated with what has been called "alternative life-styles." Users are more likely to be women, college-educated, higher-income, middle-aged people living in the West. The expansion of the practice of alternative medicine in a given community is likely to depend on the growth in the community of the higher-income populace willing to explore the potential of this medical approach.

Asheville's Potential and Path Forward

The general health industry in Asheville will continue to grow as a regional medical center, but this growth is most likely to be closely linked with the overall population growth of the region. The City should explore ways of facilitating this industry using forums and meetings with the medical community. It is possible that services for the medical industry and medical products manufacturers with a potential to relocate in or expand in Asheville could be identified through this networking process.

The growth of the alternative medicine sector could possibly be further stimulated by establishing a "Center" that would enable practitioners to have a clinic-level facility in which they could practice and share

information and research findings. Networking with existing practitioners could lead to the identification of other practitioners that could be recruited to the community.

Back Office Operations

There are no specific SIC codes representing this industry since it cuts across all industry types. Back office operations are defined as processing and transaction functions, such as claims processing, data processing, telemarketing, customer service, technical support, and teleservices that support a business staff or line units. Back office operations are the processes within a company that do not require face to face customer interaction, and generally require a large clerical labor force. Industries and businesses with back office operations include banking, insurance, credit agencies, mail order businesses, service organizations, and government and membership organizations.

The advance in telecommunications and the use of computers has facilitated the decentralization of many corporate office functions. Back office operations can now be a distinct entity, physically separated from other unrelated office functions. The approaching reality of a low-cost, national digital information network will further encourage the structuring of new office configurations. Trends that are fueling back office decentralization include the following:

- Cost reduction
- Space
- Payroll

- Corporate restructuring
- Decentralized decision-making
- Realignment
- Consolidation
- Mergers, acquisitions, divestitures
- Technological innovation
- Smaller facilities
- Greater geographic mobility
- Better and quicker customer service
- Future resource deployment flexibility
- Risk avoidance
- Improved management control
- Improved labor market situation
- Blurring distinctions among financial services firms

At the same time that customer support centers are becoming separated from non-customer support office functions, companies are also consolidating some of their various customer support centers and data processing functions into larger centers in order to benefit from economies of scale. Companies have found that by consolidating dispersed customer support centers into larger centers, they experience increased efficiency, lower costs, the ability to provide more reliable service, and improved

competitiveness. Representative back office functions that tend to be geographically mobile and ripe for consolidation include the following:

- Credit authorization
- Credit collection
- Check processing
- Accounting
- Payroll
- Data processing
- Order fulfillment
- Insurance claims processing
- Customer service
- Reservations
- Payment processing

Locational Considerations

Back office operations have several locational concerns: the availability of a large labor pool at low to moderate wages; the availability of inexpensive space, and the condition of the telecommunications infrastructure. Because back office operations tend to be somewhat labor intensive, the availability of a quality labor force is also an extremely important consideration. Typically, these operations seek locations in communities that are experiencing above-national-average growth rates and have relatively high unemployment rates.

Site locators have stated that the quality of the public school education is of significant importance to the location of back offices. Comprehensive Testing of Basic Skills (CTBS) scores in the lower grades and SAT score results in high schools are important since high school graduates are the primary target for the basic back office skills jobs.

Back office operations typically locate in business parks or even attractive industrial parks rather than in Class-A office parks. They can use multi-tenant office-showroom or office-warehouse facilities that provide them with single-story space at a reasonable cost.

These types of office operations require a reliable and high-capacity telecommunications network because the facilities transfer large volumes of data over telephone systems. Therefore, it is desirable that a chosen location be served by the most up-to-date fiber optics network with digital switching facilities. A reliable electric utility system with redundant services is also desirable.

As cost centers, back office operations focus on cost minimization when a location decision is being made. Back offices typically have the following characteristics:

- More than 50 percent nonexempt personnel,
- A core of personnel with technical skills,

- Work which involves minimal direct client contact and extensive computer usage.

Back office operations have experienced significant changes over the past few years. The increasing importance of back office operations has been driven by the need to provide quick, efficient, and reliable customer service and support to sustain a loyal customer base. Companies have implemented more extensive training programs, installed better information systems, and upgraded facilities for their back office operations.

These office-related jobs are coveted by many workers who would like to trade in their blue-collar jobs for a desk job, and by young, educated workers entering the workforce who want career advancement opportunities.

Asheville's Potential and Path Forward

Asheville should be able to attract those back offices that employ a higher percentage of skilled and higher paid workers, such as accounting, data processing, and claims processing. However, it is important that vacant office space be identified, since this industry is most likely to locate in readily available space. Since back office operations are difficult to identify, it is important to work with existing firms in the area to

determine which companies might be considering the location of a back office in the South or Mid-Atlantic region.

Call Centers

Similar to back office operations, the call center industry does not have a specific SIC code because it cuts across all industry types. There are two types of call centers in the teleservices industry: 1) inbound centers which only receive telephone calls for orders, customer inquiries, and technical assistance; and 2) outbound centers which receive calls and initiate calls for direct sales, business to business service inquiries and customer follow-up. Some companies operate call centers in-house, while others outsource the function to third parties.

The call center industry is growing exponentially. Call centers have gone from the fringe of corporate business strategy to the center, and from cost centers to significant generators of economic growth. Today, telemarketing via call centers is responsible for more direct sales than direct mail or any other medium.[15] Experts indicate that worldwide spending on call center operations ranges between $55 billion and $100 billion.

For call center operations, the critical labor-related factors are availability, productivity and cost. The success and profitability of a call center is extremely dependent upon the people who work there and how they respond to the company's and customers' questions, needs and demands.

Call center work is more highly dependent on personalities that many other industries. For many companies, a call center is the most direct link it has with its customers.

Locational Considerations

The workload of the call center often dictates labor requirements and, hence, location. Some inbound call centers respond solely to routine customer questions and requests, and telephone operator skills are all that is needed. However, many inbound centers are technical "help desks" for computers, software, and other high tech industries. And, many outbound centers conduct market research for company-specific projects and telemarketing of securities, life insurance annuities, and other similar types of products. These centers choose locations that have a well-educated labor pool, sometimes with a specific expertise or experience.

Call centers have an inherently high turnover rate. Because there are so many opportunities for jobs, companies sometimes lose key people for slightly higher wages, even after investing money in training. Call centers also lose people to burn out, since it is difficult to work on the phone eight hours a day.

Call center operations look for cities with a transient labor force and where there are labor markets composed of those willing to work part-time and flexible hours. Call centers provide employment opportunities for students; stay-at-home mothers; housewives reentering the labor market; spouses of college professors and those serving in the military; and the underemployed. Popular locations for call centers include cities with or near colleges and universities or military bases.

According to *Site Selection Magazine,* between 60 and 70 percent of total call center expenditures are attributable to labor cost.[16] Because labor is the largest cost for call centers, the Southeast, with its lower cost of living and sought-after quality of life, has been a popular location for call centers in recent years.

The locations of some back office and call center/telecommunication operations are dependent on proximity to the industries and customers they serve. Many prefer locations in the same time zone or region as the customers they serve so that business can be done during the same hours. This type of location also provides greater familiarity and understanding of the dynamics of the marketplace being served.

The same type of locational proximity is usually preferred by call centers that provide customer support and service. Customers oftentimes prefer talking to persons from the area in which they live and work. This is especially true for national companies that have different functions, each with its own requirements, located in various parts of the country.

The Southeast is a popular cluster location for call centers because of its growth, economic diversity, labor force with relevant skills and training, low operating costs, and supportive business environment.

The availability, capacity, and quality of a region's telecommunications network are of utmost importance to call center operations. Companies are dependent upon "state of the art" telecommunications technology, due to the services they provide and the markets they serve. Historically, call center locations were driven by the availability of advanced telecommunications services. However, today, even remote, rural locations have the telecommunications capabilities that the office-related target industry cluster needs and demands.

Companies look for locations that are served by fiber optics and that have sophisticated digital switching systems. They also look for long distance providers who offer an increasing number of points of presence.[17]

The change by telecommunications providers from mileage-based to flat rate pricing has opened up the nation geographically for the call center industry. Companies no longer need to be located in the middle of the country when making and receiving calls. This is extremely important to companies who wish to establish call centers near their customers.

Call center operations have unique electricity infrastructure needs. They require buildings with back-up electric generators since the electrical load per square foot is often higher than in office-type buildings. The quality of the power is also extremely important because of their dependence on computers.

Colleges and universities are an important site location criterion in this office-related target industry cluster. They enhance the area's quality of life and are an important resource for new and expanding companies. They provide educational opportunities for a company's workforce; and students and faculty spouses provide an educated labor pool. In addition, the professors are a resource for specialized in-house teaching and training or troubleshooting.

A number of cities courting the call center and back office industries are developing relevant employee training programs. For example, several

employers are developing training programs with Missouri Southern State College and Franklin Technical School. Customized training will be offered there in customer service skills, keyboarding, computer training, and medical claims processing. Tampa has also established a Customer Service Center in its Learey Technical Center. The Academy focuses on data entry, dictation, conflict resolution and other "hard" and "soft" skills. It also teaches the history of customer service, business ethics and company cultures. Companies hiring graduates include GTE, Capital One, Atlantic Lucent Technology and Promus Hotels.[18]

Call center facilities have unique building requirements. Call center operators look for single story buildings with an ample supply of parking and room for expansion. The rule of thumb is to provide parking spaces for 150 percent of the agents per shift.[19] For example, a 400-agent call center with multiple shifts should have a minimum of 600 parking spaces. An ample parking supply is also of importance to back office facilities, headquarters and other office-related activities. A cafeteria is an important amenity for call centers, especially if there are not restaurants and eating establishments nearby. Call centers also should have room to grow. Many companies who need to expand would rather add agents than undertake the site selection process again. "…The biggest mistake you can make once you've found a good location is to fail to option enough contiguous space."[20]

Vacant shopping centers are very attractive locations for call center operations. They are generally one story and have ample parking, food service capabilities, and expansion potential. In addition to adequate parking, shopping centers have lighted parking lots, which are critical to companies that have night shifts. Back office users are also finding vacant shopping centers attractive for their operations. Wal-Mart has established a Department of Economic and Community Development to find new uses for its vacant stores. The Department works with state and local government officials, utility companies, and community leaders to generate new job opportunities through the sale or lease of its vacant store for non-traditional uses.[21]

Since most states and communities cannot change their wage rates and building costs, taxes and incentives are a location factor and business cost that can impact a company's decision-making process. Financial incentives vary, and are often customized to fit a company's needs. They include tax abatements and reductions, utility rate breaks, land write-downs, access and site improvements, and paid job training. States with low or no corporate income tax are attractive locations for companies in the target industry cluster.

Industry consultants caution companies undertaking a headquarters move or relocation to make sure the location (or location alternatives) makes

business sense and accommodates its operations the best. Only after doing this should the company negotiate an incentive package.

For teleservice businesses such as call centers, telecommunication costs are often the second highest expenditure after labor. Many states have begun taxing telecommunication services in order to generate additional revenues; however, significant taxation differences exist among the states. Some states tax call centers, toll-free centers, and/ or similar types of businesses, while others impose a tax on interstate long distance services and/ or outbound calls. Some states even tax equipment that is rented from the telephone company.

States that do not have a sales tax on interstate telecommunications are among the most favored call center locations. These states include North Carolina, Arizona, Georgia, Iowa, Nebraska, Nevada, South Dakota, Tennessee, Utah and West Virginia. Three Canadian provinces, Manitoba, New Brunswick, and Nova Scotia, have repealed their provincial sales tax on toll-free number in order to attract call centers.[22] The State of North Carolina does not have a sales tax on interstate calls; however, North Carolina does have a tax on intrastate (within the State) calls.

Some states that have taxes on telecommunications are becoming more aggressive in their attempts to attract and foster growth in the call center and back office sectors. For example, Pennsylvania has a six percent tax on long distance services. However, the state's Department of Commerce is partnering with Bell Atlantic to attract back office operations, telemarketing, financial investment companies, catalog sales, reservations centers, billing and credit operations and shareholder and publishing services. The program is named "FutureSites," and five regions in the state have taken advantage of the partnership.[23]

Asheville's Potential and Path Forward

The City of Asheville should focus on those call centers that pay higher wages and seek more educated workers. This is true of customer service and technology support operations. Other call centers tend to seek large labor pools of part-time and lower wage workers, such as telemarketing, catalog fulfillment, and reservations. The relatively low unemployment levels in the Asheville labor market area and the goal of raising the level of income in the community would argue against the active recruiting of other than the higher wage call centers.

Motion Picture Production and Services

SIC 7812
SIC 7819

The motion picture production and services industry includes firms that produce motion pictures and videotapes, either for exhibition or for sale (SIC 7812). Specific examples of motion picture and videotape production are audiovisual, cartoon, non-theatrical, music video, and educational motion picture production, as well as television commercial production and television filmmaking.

Also included in the motion picture production and services industry are companies that provide services necessary to motion picture production (SIC 7819). Specific examples of these types of services are film processing, film editing, film titling, wardrobe rental, rental of motion picture equipment, studio property rental, motion picture consulting, and motion picture casting bureaus.[24]

Since 1990, nationwide employment in the motion picture industry has grown by 85%, reaching an all time high of 246,000 in early 1999. According a July 1999 report published by the Milken Institute, entitled *"America's High-Tech Economy – Growth, Development, and Risks for Metropolitan Areas,"* this high growth rate is largely due to the expanding number of technology jobs available in the motion picture industry. The Milken Report also

suggests that the large employment growth rate can be traced to "an increased demand for the industry's products in an expanding number of marketable forms."[25]

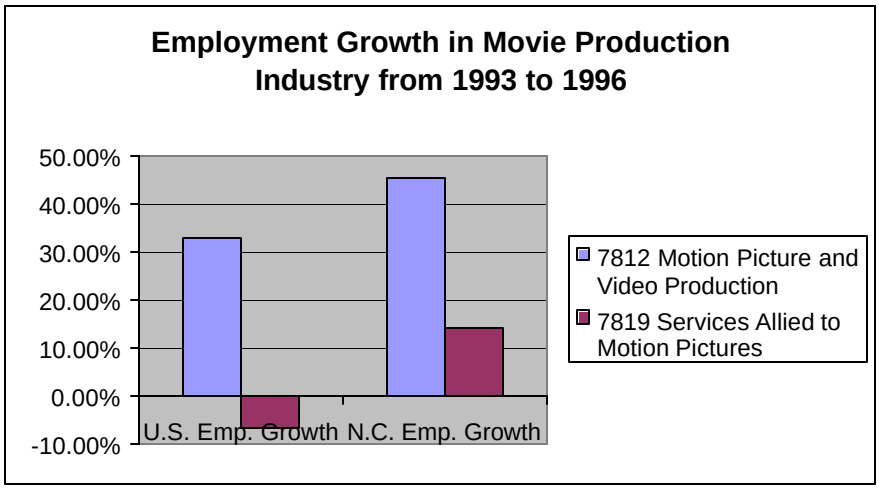
Within the United States, the majority of the motion picture industry is concentrated in California. According to the Milken Report, in early 1999, Los Angeles alone contained 152,000 of the U.S. filmmaking industry's 246,000 employees. Traditionally, there have been five companies within the U.S. Motion Picture Industry that have dominated the industry - Columbia, Disney, Fox, Universal, and Warner. These five companies alone account for approximately 75% of all motion picture industry revenues in the U.S. However, this dominance weakened a bit during the nineties, when many less expensive, independently produced films gained popularity with the public. This trend is expected to continue.[26]

According to data from the U.S. Census Bureau's County Business Patterns, employment for the state of North Carolina's motion picture production and allied services industry is on the rise. Between 1993 and 1996, North Carolina's employment in this industry grew at a higher rate than the US's employment in the industry. As indicated in the chart on the next page, North Carolina's motion picture production employment increased by 45.16%, whereas employment for that sector in the U.S. only increased by 32.69% between 1993 and 1996. Likewise, North Carolina's employment in

services allied to motion pictures grew by 14.9%, which was higher than the national growth rate for that same industry category, which was –6.58%.[27]

EMPLOYMENT GROWTH IN MOVIE PRODUCTION INDUSTRY BETWEEN 1993 AND 1996 – NORTH CAROLINA COMPARED TO U.S.*

SIC	Description	N.C. Emp. Growth	U.S. Emp. Growth
7812	Motion Picture Production	45.16%	32.69%
7819	Services Allied to Motion Picture Production	14.19%	-6.58%



Source: U.S. Bureau of the Census County Business Patterns

Employment growth is measured by the percent change in total employment from 1993 to 1996.

Currently, Buncombe County accounts for 8.27% of North Carolina's movie production industry. According to Dun & Bradstreet's October-December MarketPlace data, North Carolina has a total of 2,093 employees and 431 businesses engaged in motion picture production and allied services industry. Buncombe County has a total of 173 employees and 16 businesses involved in that same industry.[28] To be more specific, out of Buncombe County's 173 employees in the movie making industry, 165 employees are involved in motion picture production and 8 are involved in services allied to motion picture production. Out of Buncombe County's 16 businesses involved in the movie making industry, 13 firms are engaged in motion picture production and 3 firms are engaged in providing services allied with motion picture production. North Carolina as a whole has a total of 1,783 employees and 327 businesses engaged in motion picture production and a total of 310 employees and 104 businesses involved in services allied to motion picture production.

Because moviemaking is a technical form of art, advancement in technology has been and will continue to be a catalyst for change within the motion picture industry. The Milken Report points out that "technology drives the motion picture industry both in terms of production (special effects, digital photography, sound effects, editing), and by offering new venues for film marketing (multimedia such as video and computer games, DVD, Satellite, pay-per-view, toys, and theme park rides)." There are a couple of specific, technologically inspired trends that are expected to continue in the

filmmaking industry. First, because of an increasing use of digital cameras and projectors, the distinction between motion pictures and other forms of multimedia will be less clear. Also, technology should reduce production costs (including film stock, editing, and special effects) and as a result, lower the entry level for good, quality filmmakers who have limited budgets.[29]

On an international level, the United States dominates the motion picture production industry. In many foreign countries, movies made in the U.S. are as prevalent or more prevalent in box offices than domestic films.[30] In 1995, approximately 25% of U.S. film companies' revenues came from foreign sales. In fact, over the past three decades, foreign markets have accounted for approximately half of America's motion picture industry total sales.[31]

Having such a strong presence in foreign markets greatly benefits the U.S. Motion Picture Industry because it gives films that are not so successful here the opportunity to succeed in another market. In an industry where the cost of production often exceeds revenues, foreign market sales can make the difference between a movie being a financial failure or being financially productive.

There is a downside to the popularity of American films in foreign markets. According to the Milken Report, intellectual property rights and the unauthorized presentation, theft, or piracy of films in international markets

have a negative effect on the industry's export earnings. In fact, worldwide piracy costs the American film industry $15 billion each year.[32]

Locational Considerations

These industries are part of the multi-media explosion occurring in this country. Although traditional on-location filming continues to occur, an increasing percentage of movies and videos are the result of computer animation and digital visual effects. "Hollywood" feature films and television programs now routinely depend on ancillary high-technology image-processing operations for the commercial success.

To be able to compete effectively with southern California in this industry is not easy. Technology is overcoming the disadvantage of the higher costs of California. However, many firms are finding it difficult to recruit workers with computer graphics skills and other forms of multimedia expertise. Most of the workers in this growing industry have attained to high levels of educational qualification. More than 50 percent of these workers major in such fields as film, graphics, business, and computer science.

Asheville's Potential and Path Forward

The Asheville area has been the location of the filming of a number of movies over the past years. This track record has given the community the necessary recognition within the industry that could help stimulate additional opportunities. It would appear that one effective strategy for

attracting this industry would be to foster the development of multimedia technical skills in the Asheville area by creating or strengthening appropriate curriculums at UNC-A and A/B Tech.

Another strategy for building this industry would be the identification of workers currently in the Asheville area that possess the necessary skills for movie and video production. These workers should be classified by the specific skills that they can provide to an on-location filming or to a video studio. This database should be kept current and should be easily categorized and accessible.

The media workers in southern California are joined together in many different crisscrossing networks of association. These networks allow workers to collectivize their individual experiences, knowledge, information, and contacts, thus generating organizational frameworks that supplement general processes of worker socialization and job mobility. It would be possible, once the potential media workers in the Asheville area have been identified, to develop a formal networking structure to encourage their interaction.

Although Advantage West houses a representative of the film commission for the State of North Carolina, it is further recommended that Asheville join with Buncombe County to create an office of Film Liaison with a full time professional staffing it. This individual should be well connected with the

film industry and should have an adequate budget to make personal contacts with representatives of the film and video studios. This is an industry that places great stock in personal contacts.

A detailed inventory should be maintained by the local Film Liaison of appropriate sites for on-location shootings for movies, advertising, and video productions. A picture catalogue should be kept up-to-date and should anticipate, as best as possible, the particular needs for up-coming films, ads, and videos.

The Film Liaison should also be able to work closely with the City and County to arrange for on-site shootings of films and videos. This would include blocking off streets, arranging for extras, providing key services, etc.

Finally, a sound stage should be developed in Asheville. This could serve the needs not only of out-of-state film companies, but also encourage independent filmmakers and video studios. This could be developed in an older building with high ceilings that is renovated for this purpose, which would keep the costs down. This facility would also need state-of-the-art equipment to supplement the needs of the industry.

Internet Related Activities: Electronic Commerce, Internet Service Providers, Web Page Designers, etc

The Internet-Related Activity target industry is somewhat difficult to define in terms of SIC codes because it is very new and cuts across several industries. One term for this industry sector is "new media" operations. According to an article written by David Kolzow entitled, "*The Digital Economy on the Move: Non Web Siting Considerations*," this "new media" industry includes businesses and activities such as Web servers, Internet providers, and electronic commerce.[33]

Electronic Commerce

U.S. Industry and Trade Outlook defines electronic commerce as the sale and purchase of goods and services electronically. For businesses, electronic commerce means any kind of communication or collaboration with customers, suppliers and other business partners via computers linked to a network.[34]

Forrester Research forecasts that U.S. consumers will spend approximately $3.3 billion via electronic commerce in 1998 and $7.0 billion or more by the year 2000.[35] Business-to-business electronic commerce should continue to exceed the consumer sector. In 1998, on-line transactions by three companies - Cisco Systems, General Electric, and Dell Computer – totaled approximately $3.0 billion in 1997. On-line

transactions of these three companies are projected to reach $17.0 billion annually in three to five years. Business-to-business transactions for the U.S. should reach and possibly exceed $300 billion in three to five years. Cutting edge software development has paved the way for the phenomenal growth in electronic commerce. Currently, retail trade is dominating electronic commerce transactions. The next step for the U.S., Canada, and some countries in Western Europe and the Pacific Rim is the development of a safe environment in which both businesses and consumers can conduct electronic commerce. According to *U.S. Industry and Trade Outlook*, most of the world lags behind North America in electronic commerce, and will likely spend the remainder of the decade, and even beyond, developing the Internet infrastructure necessary to support electronic commerce.[36] However, where the infrastructure exists, electronic commerce is driving much of the growth in information services exports. There should be growing opportunities throughout the world in the future.

Currently, the only constraint on electronic commerce's growth is a concern for Internet security. However, according to Kolzow, "this concern is spawning new niche industries that are developing specific technologies and techniques to improve security and to ensure secure payment over both the Internet and private networks."

In addition, we are now seeing the emergence of several information service companies that operate as electronic commerce facilitators, offering services that help individuals and businesses to use different aspects of the Internet market to their advantage. Some of these companies offer a variety of means of making payments over the Internet and act as payment and billing clearinghouses for electronic commerce. Others certify the integrity of Internet sites and vendors. In doing this, they put their stamp of approval on the Internet sites.[37]

Electronic commerce is hard to document by the SIC code system of employment classification. Like other office-related sectors, such as headquarters and back office operations, it cuts across many industries, including manufacturing, services, FIRE (finance, insurance and real estate) and TCPU (transportation, communications and public utilities). However, it is most accurately defined by three SIC classifications that relate to information services: SIC 7374, Computer Processing and Data Preparation and Processing Services; SIC 7375, Information Retrieval Services and SIC 7376, Computer Facilities Management Services.

Other Internet Related Services

The Internet is expanding at a phenomenal pace. According to the "*Emerging Digital Economy*," a report published in 1998 by the U.S. Department of Commerce, the number of Americans who use the Internet grew from 5 million in 1993 to 62 million by 1997. In fact, one of the largest

Internet backbone providers, UUNET, estimates that Internet traffic doubles every 100 days. In order to meet this growing demand, many companies are emerging to help individuals and businesses utilize the World Wide Web effectively. Such companies design Web sites and advertising banners, create Web-based catalogs, build security tools, create and track direct marketing campaigns, provide consulting services, and develop technology to speed the flow of data and information across the network.[38]

According to *U.S. Industry and Trade Outlook* '99, employment in the information services sector doubled between 1985 and 1996 from under one-half million workers to over 1 million workers. The Bureau of Labor Statistics projects that employment in this industry will double again by 2006 to two million. A survey of 5,606 IT executives across the U.S. indicated that IT job growth will continue into the next year, and the strongest demand will be for people with Web-site development design skills, e-commerce experience, and networking skills (Management Recruiters International, Inc.).[39] *U.S. Industry and Trade Outlook, '99* indicates that because of the increasing presence of the Internet, there is now a tremendous demand for workers who can design web pages, create graphics, code documents in Hypertext Markup Language (HTML), and program in Internet languages such as Java and C++.[40]

Because workers are in such high demand in the information technology industry, wages in this industry are extremely competitive. This is no

exception in the Internet-related services sector of IT. Web masters, who are responsible for design, development, operation, and maintenance of Web sites, start out earning salaries between $35,000 and $50,000 per year. Highly experienced Web masters earn $100,000 or more. Web developers, who are responsible for the actual creation of Web sites, are reported to earn a median salary of $55,000 per year. Even on the lower end of the skill level in Internet jobs, there is the potential to earn competitive wages. For example, customer service representatives who work for Internet service providers typically earn from $14,000 to $17,000 per year, but they can earn up to as much as $35,000 per year, depending on experience.[41]

Location Requirements

The location requirements for businesses in the Internet-related services industry are similar to those of the software industry. Importance is placed on a skilled labor force, proximity to a college, university, or research center, and advanced telecommunications access. Often, establishments offering Internet related services tend to be located near one another in clusters, or "cyber districts." In his article, David Kolzow describes cyber districts as "urban centers where the right combination exists of advanced telecommunications, satellite hookups, high-speed videoconferencing, redundant fiber-optic networks, etc."

Silicon Valley has been the largest, most well-known "cyber district." According to a July 26, 1999 article in *Industry Standard Magazine*, Silicon

Valley "generates far more Internet business revenues and attracts more venture capital than any other Web market." The article also reports that Silicone Valley is home to 58 "pillar companies," which are "giant Internet and technology firms that breed savvy executives, skilled technicians and funding for lots of Web startup offspring." [42]

Although Silicon Valley does have the largest Internet services market, other locations are emerging as new cyber districts. Examples of new areas where Internet-related companies are flourishing are: The "Silicon Alley" of New York City; Craig Street in Pittsburgh; Boulder, Colorado; The Old Port Area of Montreal; Greater Los Angeles; and Dallas / Fort Worth.[43]

Asheville's Potential and Path Forward

The activities by the community to stimulate this industry are similar to those of the movie and video industries. Programs need to be created and enhanced in the local higher education institutions to provide the type of technical workforce and professionals needed in this industry. The emphasis is on computer software, computer science, telecommunications systems, and other electronically related knowledge and proficiency. This should be addressed in the strategic planning effort of the education task force that has been investigating this topic.

An incubator facility for this industry may also stimulate entrepreneurial activity. An incubator facility incorporates inexpensive space, shared

services, state-of-the-art computer systems and telecommunications systems, access to professional and technical expertise, and start-up financing.

Every effort should also be made to create a network of professionals in this industry within the Asheville area with the intent of encouraging sharing of information, developing alliances, doing joint proposals, attending relevant trade shows, and reducing operating costs through cooperative purchasing.

The Environmental Technology Industry

One of the rapidly emerging industries in the U.S. economy has been environmental technology. This growth has been based on increasing worldwide concern for environmental quality and recognition that economic development must be environmentally sustainable.

The North Carolina Environmental Technology Consortium defined environmental technology as: Those *that create, develop, adapt, and apply products, systems, and services to monitor, eliminate, control, treat, and prevent pollution and conserve and restore natural resources.* This is similar to the definition developed by the Environmental Technology Cluster of Arizona that stated: Businesses *that create and provide products and services that use technology to monitor, eliminate, control, treat, and prevent pollution and to conserve and restore natural resources.*

The environmental industry includes all revenue-generating activities associated with:

1. Compliance with environmental regulations
2. Environmental assessment, analysis, and protection
3. Pollution control, waste management, and remediation of contaminated property
4. The provision and delivery of the environmental resources of water, recovered materials, and clean energy

5. The technologies and activities that contribute to increased energy and resource efficiency, higher productivity, and sustainable economic growth (enabling pollution prevention).

Because this industry is a composite of numerous manufacturing and service operations, it is difficult to obtain accurate information on its activities. It has been estimated that the global market for environmental technologies was $200 billion in 1990 and $295 billion in 1992, and it is projected to reach $400 billion by the year 2000.

In 1996, the U.S. environmental industry consisted of around 110,000 firms and revenue-generating organizations. Approximately 1.3 million workers were estimated to be employed in some sector of this industry in the U.S. Employment in this industry in 1994 was larger than that in chemicals and allied products (824,000), paper and allied products (621,000), aerospace (535,000), and motor vehicles and car bodies (234,000).

The majority of these firms and organizations are in the public sector, providing potable water and wastewater treatment services to limited geographic areas. Among the private sector firms, the largest portion provides solid waste management services to communities in defined areas across the country.

THE U.S. ENVIRONMENTAL INDUSTRY

Environmental Industry	% Growth 1990-92	% Growth 1992-94	% Growth 1994-96
Services			
Analytical services	-7.8	-6.4	-10.6
Wastewater treatment works	5.4	5.6	5.8
Solid waste mgmt	8.0	9.9	9.4
Hazardous waste mgmt.	6.6	-3.5	-6.6
Remediation / Industrial services	-2.6	8.7	2.1
Consulting & engineering	14.4	7.0	-0.6
Equipment			
Water equipment & chemicals	8.4	6.6	12.1
Instruments & information systems	29.1	10.9	10.1
Air pollution control equipment	5.0	5.4	8.0
Waste mgmt. equipment	6.7	0.9	6.9
Process & prevention technology	46.3	26.7	10.5
Resources			
Water utilities	10.6	10.5	8.9
Resource recovery	-6.9	26.1	-6.7
Environmental energy sources	12.6	11.7	8.2
Total	6.5	8.4	5.4

The U.S. environmental market has recently matured as an industry. It now suffers from waning regulation-induced market growth. Industry-wide annual growth that ranged between 10 percent and 15 percent in the period 1985 to 1990 declined to 1 to 5 percent between 1991 and 1996. Many

environmental companies are now in a “survival mode” with insufficient confidence to invest in a future with uncertain market demand.

Unfortunately, information on this industry is difficult to obtain. Confusion often exists between what is part of the environmental industry as a whole, and what is part of environmental technology. It is hard to extract the environmental technology component from the overall industry.

Historically, the largest segment of the environmental technologies market has belonged to the U.S. Recently, however, this market dominance has been challenged by Japan and Germany. Although the industry boasted a trade surplus of $9.3 billion in 1996, U.S. firms in several sectors appear to be falling behind their foreign competitors. Despite a growth of international trade of 64 percent between 1993 and 1996, the U.S. environmental industry still generates only 9 percent of its revenues from outside its borders. By comparison, our major competitors of Japan, Germany, and other countries in Western Europe typically generate 15 to 20 percent of their revenues from exports.

In addition to the competition abroad, imports into the U.S. market are also growing. This is necessitating continued industry investment to preserve and expand competitiveness; and foreign competitors have acquired a number of significant U.S. environmental firms.

In general, the U.S. environmental industry is very competitive in most environmental service segments, but trails in some equipment segments. U.S. companies rate highest in such segments as solid waste management (in which the industry is notably competitive), hazardous waste management, engineering, remediation, analytical services, and information systems. Many of the service segments that possess a comparative advantage – e.g., consulting and engineering, analytical services, and remediation – are not those in strongest demand either in the established markets of the developed world or in developing markets. The U.S. has an affirmed leadership in environmental instrumentation, a segment from which U.S. companies generate the majority of their export revenues, and in the management of large construction projects. U.S. firms are moving rapidly into the fast-growing pollution prevention sector, but this sector represents only about 1 percent of the industry's total revenues.

Environmental Business International (EBI) estimates that North Carolina's environmental technology industry represents 2.2 percent of the market in revenue and job generation. This placed it 13th among the states in the early 1990s. In 1996, North Carolina's environmental businesses generated more than $4.2 billion in revenues and employed about 43,000 workers. Recycling is the largest environmental business segment, with 586 operations generating almost $950 million in annual sales in 1996. The environmental consulting and engineering segment is second largest, with 530 companies responsible for almost $570 million in environmental sales.

A survey of North Carolina and Arizona environmental technology firms in the early 90s found that the industry in the state is dominated by small firms. A high percentage (36 percent) of the respondents in North Carolina reported annual gross revenues of less than $250,000. Only 4.1 percent reported annual gross revenues of $10 million or greater. The largest companies in the environmental industry are in the air pollution control equipment, waste management equipment, and hazardous waste segments. These companies also have some of the highest average sales per employee.

North Carolina environmental technology businesses are involved in such activities as:

- Air and water pollution control and analysis
- Bioremediation
- Energy conservation
- Environmental site assessment
- Solid and hazardous waste management
- Pollution prevention
- Underground storage tank management
- Wetlands management

It is expected that there will be a declining market in remediation and restoration activity, particularly involving underground storage tanks, and water treatment. The greatest increase is likely to be in air pollution control. Increases are also likely in energy production activities, bioremediation, and

information/database management. The majority of firms will continue working in the area of pollution prevention as well.

A shift in demand is occurring for new types of products and services that enhance the efficiency of production processes, thereby reducing pollution. Similarly, more customers are seeking environmental services that are multi-media, or integrated, in nature. These firms have told their environmental product and service providers that their future competitiveness is dependent on continued movement in this direction. Overall, they are shifting their demand solutions that turn costs into productive investments, reflecting the need to make both economic and environmental progress in their operations.

The investment rate in R&D for environmental companies for new products and services is very low, and R&D investment is concentrated in about half of the industry's segments. Many U.S. engineering, environmental infrastructure, and service companies make no investments in technology R&D and product development. The number of companies on the equipment side investing in research continues to decline because of market uncertainties.

Geographical concentrations of environmental technology firms have emerged as the industry grows. Concentrations, or clusters, are now found in the San Francisco Bay area, the Houston-Galveston corridor, and the New

York-New Jersey-Pennsylvania Triangle. Smaller or emerging clusters can be found in Colorado, Oregon, and Arizona.

The environmental technology industry in North Carolina is primarily clustered in two areas of the State. The Research Triangle (Durham, Orange, and Wake counties) is home to many firms involved in consulting, engineering, and research and development. Major government and university research facilities are located in this region.

The second concentration of firms is found between Burlington, Charlotte, and Catawba Valley (Alamance, Guilford, Randolph, Davidson, Cabarrus, Mecklenberg, Gaston, Lincoln, Catawba, Rowan, Iredell, Davie, and Forsythe counties). This region contains a larger proportion of environmental technology producers and users.

North Carolina environmental technology firms serve customers in the State, in the Southeast, and across the nation. More than a third of the firms surveyed in the early 90s export, and the interest in overseas markets is likely to continue growing.

The primary purchasers of environmental products and services are municipalities, power and water utilities, the mining industry, and several traditional manufacturing sectors.

Survey respondents in the early 90's indicated that the uncertain regulatory climate was the most significant impediment to the growth of the environmental tech industry. The demand for environmental technology products and services has been driven primarily by environmental regulations. Recent surveys of senior industry executives indicate that the environmental regulations that created much of the market growth now have a diminished influence on demand. Since 1991, substantial compliance with existing regulations has been reached by most major industrial sectors, creating cost pressures on many of the industry's customers.

Other important barriers to business success in this industry are access to a skilled workforce, financing difficulties, and technological impediments. Surveys indicated that environmental technology firms could benefit from assistance in:

- Obtaining information on business development
- Securing funds
- The identification and development of markets, and
- Technology transfer to users.

The North Carolina Environmental Technology Consortium was established to stimulate development of the environmental technology industry in the State. Its mission statement is:

> *To facilitate the statewide development, manufacture, commercialization, and export of environmental technologies, systems, and services that*

contribute to the competitiveness and growth of North Carolina's economy. The Environmental Technology Consortium will catalyze collaboration among and between industry, government, higher education, and non-profit sectors to establish North Carolina as a recognized leader in the creation, development, application, adaptation, commercialization, and export of environmental technologies, systems, and services.

Locational Considerations

The successful expansion of this industry within a particular region will depend in part on the existence of the appropriate support infrastructure. Key elements of this infrastructure are:

- A strong research / training relationship between universities / colleges and the industry.
- An active industry-wide trade organization or association.
- A large base of skilled technical workers.
- A favorable state regulatory climate.

With the erosion of regulation-induced demand, buying patterns for environmental products and services are undergoing a fundamental change: from a predominant demand for pollution control, waste management, and remediation to an evolving demand for resource productivity and environmental improvements that enhance competitive advantage. As this change gathers momentum, the environmental market is beginning a shift

from one dominated by activities making up for the past, to one dominated by preparations for the future.

The leaders of the environmental industry and many of their customers suggest that a broad-based U.S. environmental industry can provide products and services to enable the resource efficiency, high productivity, and sustainable growth which are necessary to a high quality of life in the U.S. and a spiraling population worldwide. They see the future of the industry as increasingly an engine for *simultaneous* economic growth and environmental protection, and believe that its customers will increasingly seek resource efficiency and economic competitiveness. It is also their opinion that the environmental firms will have a continuing desire to control management decisions that are central to their operations. In addition, the industry leaders believe that their public sector customers face steady pressure to tighten budgets, limiting their ability to modernize and creating pressure to privatize. Industry leadership in these transitions will not only be sustaining, but also can leverage the environmental industry as an essential contributor to national environmental, efficiency, productivity, and sustainability goals.

Asheville's Potential and Path Forward

It would appear that the environmental technology has only limited potential for the Asheville area. This metro area lacks the technical programs at the university level and the skilled workforce base needed by

this industry. Certainly, the community may be successful in attracting environmental firms, just as it may attract any other high technology firms that are more interested in the quality of life of their location than the technology resources available locally. However, it would not appear that the City would be particularly successful in a targeted marketing effort directed at this industry. However, if Asheville were able to put in place a holistic and sustainable environmental program that was nationally recognized, it might be able to draw attention from those firms interested in associating their location with such a community.

Software Industry

SIC 7371
SIC 7372
SIC 7373

The software industry is one of the fastest growing in the United States. Based on value-added, it is the third largest manufacturing industry in the country, trailing only motor vehicles and equipment and electronic components. Between 1990 and 1996, the software industry's annual rate of growth was 12.5 percent, approximately 2.5 times greater than the rate of the growth for the U.S.[44]

Software is transforming how business is conducted, how people interact with each other and how information is obtained around the world. It is changing the retail industry through electronic commerce, the banking industry through electronic financial services, and the health care industry through the use of computers and databases, electronic storage and retrieval, electronic prescriptions, and the reliance on imaging technology software. Software is making a significant impact on all of our lives.

The software industry also is having a significant impact on the U.S. economy, which should continue to an even greater extent in the future. According to the Business Software Alliance, in 1996, the direct impacts of the software industry included a $102.8 billion market for software and related services, $15.1 billion in direct and indirect federal and state taxes

as well as 619,400 jobs. In addition, the industry's spin-off or ripple effects generated over two million jobs (approximately three percent of U.S. employment) and $83.7 billion in wages. It is forecasted that by 2005, the software industry will generate in excess of 3.3 million direct and indirect jobs, paying $139.3 billion in wages. Tax revenues generated are projected to grow to $25 billion. Today, more than seven percent of revenues are dedicated to research and development (R&D).[45]

The software industry is comprised of 6 distinct groups:[46]

1. PC packaged applications ("shrink-wrapped software");
2. Operating systems for both standalone and networked systems;
3. Management tools for networks;
4. Enterprise software that enables efficient management of large corporations' productions, sale and information systems;
5. Software applications and operating systems for mainframe computers; and
6. Customized software for specific industry management.

These six facets of the software industry are included in three SIC classifications: SIC 7371, Computer Programming Services; SIC 7372, Prepackaged Software, and SIC 7373, Computer Integrated Systems Design. These sectors comprise the software sector of the target industry cluster.

Packaged software is the largest grouping of the software industry. Packaged software is written for mass distribution and not for the needs of specific users. There are four categories of packaged software:[47]

1. Operating systems, which control the basic functions of a computer network;
2. Utilities, which perform support functions, such as virus protection and back-up;
3. Programming languages, which are used to create the instructions that build other kinds of software; and
4. Applications, which include word processing, e-mail, spreadsheets, CAD (computer-aided drawing), CAM (computer-aided manufacturing), CAE (computer-aided engineering), reference software utilized in the home, and games.

Based on research conducted by the International Data Corporation, revenues for the global prepackaged software industry were $120 billion in 1997, an increase of 15 percent over 1996. The U.S. was responsible for 70 percent of the total global revenue, due to its development of software for business, schools and home. Based upon this trend, the U.S. Department of Commerce projects that the global packaged software market will reach $221.9 billion by 2002.[48]

A number of factors contribute to the strength of our domestic software industry. First among these is the leading role the U.S. has played in developing the software industry. Over the past several years, the U.S. has become the home of high quality, cutting edge software, which has given the U.S. a distinctive competitive edge around the world. Second is the sophistication and size of our country's marketplace, which has generated numerous firms, niche products and robust competition.

According to the Software Publishers Association *1997 Consumer Survey* report, nearly 40 percent of American homes have personal computers, a six percentage point gain over 1995's 34 percent. Use of online services and the Internet is growing, with households spending nearly 10 hours per week connected to the Internet. The most popular online activities are e-mail, research and reference, educational sites and obtaining news. One in five Internet users (20 percent) indicate that they have purchased an item from an online source. The *Survey* indicates that the most popular purchases are software, computer hardware, books, tickets and music CDs.[49]

Locational Considerations

All industries choose a location based upon specific site location criteria. The key criteria for the software target industry are described below.

The Workforce

As in other industries, the workforce is of utmost importance to companies in the software industry. The most critical labor force factor is the availability of an adequate supply of workers with the right skills and training. According to the Information Technology Association of America (ITAA), "one in ten jobs for software professionals goes vacant today."[50]

So critical is the issue of labor availability that the first National Information Technology Workforce Convocation was held in January, 1998. The conference was sponsored by ITAA, the U.S. Departments of Commerce and Education, and the University of California at Berkeley. It focused on workforce issues and means of expanding the pool of workers in the information technology (IT) industries, which include software.

The following six task forces met at the Convocation and will continue to work on specific issues:

- Basic Math and Science Competencies, which is focusing on building interest and competency in math and science so that future IT workers possess the necessary skill sets.
- Image of the IT Professions, which is working to find means to alleviate misconceptions about IT careers by emphasizing the exciting and dynamic opportunities that the career path offers.

- Quality and Productivity Issues, which is concentrating on efforts to maintain a high quality, cost efficient IT workforce and the potential development of an educational/training infrastructure which will enable the US to produce world-class software engineers.
- Underrepresented Groups, which is working to expand the supply of potential workers in the IT field to include more women, minorities, vocational students and other nontraditional IT workers.
- Responsiveness of Industry and Higher Education, which is seeking to facilitate the exchange of information and resources so that appropriately skilled workers enter the marketplace.
- Skill Upgrading of the Current Workforce, which is identifying ways to enhance the skills of current workers.

The National Software Alliance, a consortium of government, industry and academic leaders recently issued a report stating the U.S. will need "137,000 new software workers each year between 1996 and 2006 to meet projected growth in software occupations." The conclusion of the report is that the "supply of computer-science graduates from universities, two-year colleges and trade schools is far short of the number needed by industry." The impact of the software worker shortage is significant, and is impacting both the public and private sectors. It also has long term consequences for U.S. competitiveness.[51]

Currently, new workers in the software industry are coming from other professions, such as electrical engineering; from out of retirement; and from the unemployed. However, the supply from these alternative sources is decreasing.

Some industry observers, analysts, hiring managers and educators state there is not a labor shortage but a skill shortage. Because technology is continually changing and extremely competitive, growing demand exists for more workers who possess more sophisticated skills.[52]

The software industry, like other sectors within the IT industry, requires a broad-based labor pool with a wide range of skills. Persons with those skills include a broad spectrum of professionals, from programmers, computer scientists, computer engineers, and systems analysts to those with business skills, technical brainpower and sales capabilities.

According to Computerworld's latest hiring forecast survey, managers cannot find people with the "smorgasbord" of skills they need. However, for many companies, technical skills need to be complemented with creativity, innovation and the mind-set to apply technology to business goals. "We are moving into a knowledge economy where working capital is intellectual capital. And a knowledge economy is a high-wage economy."[53]

Companies with manufacturing employees who are trained typically expand existing facilities rather than move to a new location(s). Moreover, many companies choose to cluster new research facilities, engineers, scientists and technicians in locations where they already have a presence. This is so of Microsoft, Apple and IBM.

For those companies who decide to relocate or open operations in new locations, they are more likely to go to areas where there are similar types of companies. These areas offer a potential labor pool of trained workers and professionals who may be interested in moving to a new company.

Since one of a company's largest operating costs is labor, firms look for locations where hourly wages and annual salaries are cost competitive compared to other areas in the country and abroad. Currently, the labor/skill shortage in the cluster and the entire IT industry is driving up salaries for new graduates as well as for those with experience. Hence, local salaries and wages are an important labor-related factor for companies in the target industry cluster.

Companies in this target industry also seek strategic locations, perhaps near or in a research park, such as Research Triangle Park in North Carolina and the Hudson Valley Research Park in East Fishkill, New York. An important benefit of a research park location is its formal relationship with universities and specialized educational and scientific institutions.

These institutions can share their resources with target industry companies; hence lowering their operating costs. They also provide a future labor pool and can assist with identifying and interviewing skilled technical and research students and professionals.

Industry Clusters

Many companies and independent contractors in the software industry seek locations in industry clusters when they start-up their businesses, and/or plan an expansion or relocation of their facilities. Clusters offer many strategic benefits, including available labor with relevant skills and training; available venture capital; ability to reach and use scientific and university communities; an entrepreneurial spirit that enhances technology innovation; training facilities, and a supportive business environment.

Companies focused on "cutting edge" technologies, like those in the target industry cluster, thrive in locations with academic and research institutions. They also prefer locations that have an established high technology base, such as computerized imaging, computer manufacturing, telecommunications, pharmaceuticals and biotechnology.

Major industry clusters for software companies include Boston and Route 128; Stanford and the Silicon Valley; the Hampton Roads area of Virginia; Chicago and the Silicon Prairie; Austin, and the Seattle area.

These areas all have a very strong research capacity provided by major research universities, such as Harvard and MIT, the University of California and Stanford, the University of Chicago, and the University of Texas. The areas also have major established research parks, such as the Research Triangle Park, or R&D areas, like the Silicon Valley and the technology corridor of Seattle, Bellevue, Redmond and Kirkland in the state of Washington. These locations provide target industry companies with the crucial linkages they need to both the academic community and the business world.

One of the primary reasons behind the Silicon Valley's economic success is the number of venture capitalists interested in investing in bright ideas and new company start-ups. In 1995, venture capitalists invested over $2.0 billion in small companies in the Silicon Valley. Six thousand (6,000) high tech companies are located in the Silicon Valley. Of these, one-fifth has grown by more than 20 percent per year over the past four years.[54]

The Silicon Valley also thrives because it has identified means by which to promote collaboration and trust. Moreover, it has a network of small companies that are flexible and able to respond to change. "The unit of competitiveness is not the company, nor the sector, but the network."[55]

Telecommunications

The availability, capacity and quality of a region's telecommunications network are of utmost importance to software companies. Businesses are dependent upon "state of the art" telecommunications technology, due to the services they provide and the markets they serve.

Utilities

Reliable electric power is vitally important to companies in the software industry. Companies rely on a steady, high quality power supply to operate; run computers, imaging devices and other types of equipment; and to maintain heat and light. As businesses and their facilities become more technologically sophisticated, electric power reliability is growing in importance. New sophisticated computers and other types of equipment are particularly sensitive to brownouts and power outages. Such outages can be costly in terms of ruined and lost products, downtime, and a subsequent loss of time to market for software companies.

Colleges and Universities

Colleges and universities are an important site location criterion for the software target industry. They provide educational opportunities for a company's workforce, and students are a potential employment pool. Faculty, "state of the art" equipment, computer and research laboratories, and university-related research parks are significant resources for companies.

A university with a computer department and an engineering school give a community a competitive edge in site selection for companies in this target industry. Furthermore, colleges and universities that offer bachelors and advanced degrees in computer engineering, computer science, computer programming and similar courses provide a community with an even greater competitive edge in the site selection process.

The importance of colleges and universities is especially true in light of the labor shortage, previously described, and the growing need for more employees with the skills, education and interests needed by companies in this target industry and the entire IT industry. For the first time, industry, academia and government are working together to expand the pool of workers in the profession for the long-term. Their efforts are of great importance if the U.S. is to retain its worldwide dominance and competitive edge in the IT industry.

Vocational and Technical Schools

Training is becoming increasingly important for companies in today's highly competitive, technical world. Since workforce skills and quality are so critical in the target industry cluster, companies look for locations with post-secondary vocational training schools.

Good local vocational and technical schools are an asset because they provide a labor pool of properly skilled workers entering the marketplace. They also are a resource for retraining employees who need to enhance their skills as job requirements change to meet market demand and to learn new technologies. Vocational and technical schools have a critical role to play in ameliorating the labor / skill shortage previously described.

Transportation

Access to regional, national and international markets is of critical importance to companies in this target industry. Companies in the software sector seek locations with good transportation accessibility by air freight, that are served by international airports and that have several daily deliveries and shipments from Federal Express, UPS, Airborne Express and similar package delivery companies.

Also of critical importance is the ability of suppliers to provide the supplies, equipment and other resources that are needed for the target industry companies to operate and conduct business. A transportation network composed of highway and air service is preferred.

International airports are important because they provide greater ease in traveling for employees, customers and guests between the U.S. and the foreign marketplace. As global opportunities increase exponentially in the

coming years, the presence of an international airport will grow in importance.

Employee commute patterns also play a role in location decision-making. Companies look for locations that are well served by highways and the local arterial road system so that employees can get to work as easily as possible. The local public transportation system is growing in importance as a means of getting employees from home to work in a timely, cost-efficient, non-polluting manner.

Quality of Life

Quality of life is a significant locational factor for companies throughout the competitive information technology industry. It plays a major role in attracting and retaining a highly skilled workforce and professionals in an industry that is experiencing both a labor and skills shortage.

Companies look for areas that have an affordable cost of living; available housing supply that responds to the income levels of its employees; quality K-12 school system; good colleges, universities and technical schools; moderate climate; and cultural and recreational opportunities. These are the same quality of life factors that are important to other knowledge industries, *i.e.*, pharmaceuticals, biotechnology, aerospace and semiconductors, so the competition among these industries for employees at all levels is keen.

Asheville's Potential and Path Forward

Generally, the software industry does not relocate or expand elsewhere. The exceptions tend to occur in those communities that have developed substantial academic and professional capabilities in computer sciences, but don't have the concentrations of this industry and consequent labor pressures found in the Seattle area or California. Unfortunately, the higher education institutions of the Asheville area do not have significant enough computer science programs to attract the desired attention of software firms.

It is recommended, given the importance of this industry and the other knowledge-based industries being targeted, that a concerted effort be made to strengthen the academic offerings in multimedia and computer sciences. A pool of available, skilled graduates will attract the attention of those firms who cannot meet their workforce requirements elsewhere. Also, and probably more importantly, these graduates may be the foundation for entrepreneurial activity in these industries.

The concept of a "Knowledge Center" is also applicable here. It can serve as a resource to start-up companies in these knowledge-based industries.

[1] *"America's High Tech Economy – Growth, Development, and Risks for Metropolitan Areas": Ross C. DeVol, Milken Institute, July 13, 1999.*
[2] *"The Emerging Digital Economy II", U.S. Department of Commerce*
[3] *Ibid*
[4] *Ibid*
[5] *Ibid*
[6] *Standard Industrial Classification Manual, 1987: Executive Office of the President, Office of Management and Budget, 1987.*
[7] *U.S. Industry and Trade Outlook, '98: Standard & Poors/U.S. Department of Commerce/International Trade Administration, 1998.*
[8] *Ibid*
[9] *"Steady growth in health occupations, 1986-96 and projected 1996-2006", Occupational Outlook Quarterly, Spring 1999 v43 il p 40(1): U.S. Department of Labor, 1999.*
[10] *U.S. Industry and Trade Outlook '99, U.S. Department of Commerce, 1999.*
[11] *Standard Industrial Classification Manual, 1987: Executive Office of the President, Office of Management and Budget, 1987.*
[12] *Ibid*
[13] *Ibid*
[14] *Ibid*
[15] *Site Selection, "Busy Signal: The Explosive Growth of Call Centers," June/July, 1997.*
[16] *Site Selection, "Busy Signal: The Explosive Growth of Call Centers," June/July, 1997.*
[17] *Plants, Sites and Parks, "Opportunity Calling," November/December, 1995.*
[18] *Expansion Management, "The Truth About Telecom Cities," May-June, 1998.*
[19] *Site Selection, "Busy Signal: The Explosive Growth of Call Centers," June/July, 1997.*
[20] *Ibid.*
[21] *Area Development, "Build Parking and They Will Come," May/June, 1997.*
[22] *Plants, Sites and Parks, "Opportunity Calling," November/December, 1995*
[23] *Ibid.*
[24] *Standard Industrial Classification Manual, 1987: Executive Office of the President, Office of Management and Budget, 1987.*
[25] *"America's High Tech Economy – Growth, Development, and Risks for Metropolitan Areas": Ross C. DeVol, Milken Institute, July 13, 1999.*
[26] *Ibid*
[27] *County Business Patterns for 1993 and 1996, U.S. Bureau of the Census, www.census.gov*
[28] *MarketPlace, Jul-Sep 1999, Dun & Bradstreet, Inc., 1999*
[29] *"America's High Tech Economy – Growth, Development, and Risks for Metropolitan Areas": Ross C. DeVol, Milken Institute, July 13, 1999.*
[30] *U.S. Industry and Trade Outlook '99, U.S. Department of Commerce, 1999.*
[31] *U.S. Industry and Trade Outlook '98, U.S. Department of Commerce, 1998.*

[32] *"America's High Tech Economy – Growth, Development, and Risks for Metropolitan Areas": Ross C. DeVol, Milken Institute, July 13, 1999.*
[33] *"The Digital Economy on the Move: Non-Web Siting Considerations", David R. Kolzow, U.S. Sites and Development, May 1999.*
[34] *U.S. Industry and Trade Outlook 1998, DRI/McGraw-Hill and Standard & Poor's and the U.S. Department of Commerce/International Trade Administration.*
[35] *Wall Street Journal, "The Outlook, Internet Is Opening Up A New Era of Pricing," June 8, 1998.*
[36] *U.S. Industry and Trade Outlook 1998, DRI/McGraw-Hill and Standard & Poor's and the U.S. Department of Commerce/International Trade Administration.*
[37] *"The Digital Economy on the Move: Non-Web Siting Considerations", David R. Kolzow, U.S. Sites and Development, May 1999.*
[38] *"The Digital Economy", U.S. Department of Commerce, 1998.*
[39] *"No End in Sight for Surge in IT Job Growth – Networking, Web Site, E-Commerce Skills Most Sought," Mateyaschuk, Jennifer, Information Week, CMP Publications, 1999.*
[40] *U.S. Industry and Trade Outlook 1999, DRI/McGraw-Hill and Standard & Poor's and the U.S. Department of Commerce/International Trade Administration.*
[41] *U.S. Industry and Trade Outlook 1999, DRI/McGraw-Hill and Standard & Poor's and the U.S. Department of Commerce/International Trade Administration.*
[42] *"The Valley Still Reigns", Thompson, Maryann Jones, Industry Standard, July 26, 1999.*
[43] *"The Digital Economy", U.S. Department of Commerce, 1998.*
[44] *Business Software Alliance, "Building An Information Economy," June 1997.*
[45] *Ibid.*
[46] *Software Publishers Association, "Packaged Software Industry Revenue and Growth."*
[47] *Ibid.*
[48] *U.S. Industry and Trade Outlook 1998, DRI/McGraw-Hill and Standard & Poor's and the U.S. Department of Commerce/International Trade Administration.*
[49] *Software Publishers Association, Press Release, "New Consumer Survey Shows Almost 40% of American Homes Now Have Personal Computers," March 31, 1997.*
[50] *ITAA Press Release, "National IT Worker Shortage Convocation Launches Quest for Systematic Solutions," January 12, 1998.*
[51] *Electronic Engineering Times, "U.S. 'far short' of needs for software workers," January 26, 1998.*
[52] *Computerworld, "Pressure Gap: Transforming the IT Workforce," February 2, 1998.*
[53] *Ibid.*
[54] *New Statesman," A Slice of the Silicon Pie: California's Success at Plugging into a Knowledge-Based Economy Has Important Lessons for New Labour," 1996.*
[55] *Ibid.*